

CLAIMS

1. A GaN-based semiconductor device comprising:
a GaN substrate having a low-density defect region and core portions present in said low-density defect region in a periodic planar arrangement in said substrate as a high-density defect region passing through substrate;

a multilayer structure of GaN-based compound semiconductor layers formed on said GaN substrate; and

an electrode portion having an electrode provided on said multilayer structure and a pad metal formed on an insulating film deposited on said electrode and electrically connected through an opening of said insulating film to said electrode;

said electrode portion being provided on said multilayer structure in a region except said core portions of said GaN substrate.

2. A GaN-based semiconductor device according to claim 1, wherein said periodic planar arrangement includes a continuous belt-shaped arrangement, an intermittent belt-shaped arrangement, and a dotted dispersive arrangement.

3. A GaN-based semiconductor device according to claim 1 or 2, wherein said electrode portion is provided

on said multilayer structure in said low-density defect region between said core portions adjacent to each other.

4. A GaN-based semiconductor device according to any one of claims 1 to 3, wherein said pad metal is provided on said multilayer structure in said region at a position spaced apart from the center of each core portion by a distance of 100 μm or more.

5. A GaN-based semiconductor device according to any one of claims 1 to 3, wherein said electrode is provided on said multilayer structure in said region at a position spaced apart from the outer edge of each core portion by a distance of 50 μm or more.

6. A GaN-based semiconductor device according to any one of claims 1 to 5, wherein a counter electrode to said electrode is provided on the back surface of said GaN substrate.

7. A GaN-based semiconductor device according to any one of claims 1 to 5, wherein a counter electrode to said electrode is provided on said multilayer structure.

8. A GaN-based semiconductor device according to claim 7, wherein both said electrode and said counter electrode are provided on said multilayer structure in said region except said core portions of said GaN substrate.

9. A GaN-based semiconductor device according to any one of claims 1 to 8, wherein said electrode is one of a p-side electrode and an n-side electrode, and said counter electrode is the other of said p-side electrode and said n-side electrode.

10. A GaN-based semiconductor device according to any one of claims 1 to 9, wherein said GaN-based semiconductor device comprises a GaN-based semiconductor light emitting device including a GaN-based semiconductor laser device and a GaN-based light emitting diode.